

LIST OF CLAIMS / AMENDMENTS

In the Claims

Claim 19 was previously canceled.

Please cancel claims 27, 29-54, 64, 67, and 71-86 without prejudice.

Please amend claims 1-18, 20-26, 28, 55-63, 65-66, and 68-70 as shown herein.

Claims 1-18, 20-26, 28, 55-63, 65-66, and 68-70 are pending and are listed following:

1. (currently amended) A network system, comprising:

a first computer configured to maintain an object comprising a plurality of multi-valued attributes that each have associated values, at least one having-a multi-valued attribute that includes of the object having a link table value that links to a link table which includes a plurality of individual linked values, the individual linked values having associated therewith respective conflict-resolution data, and wherein where the first computer is adapted to update the conflict-resolution data associated with at least one linked value in the link table in response to at least a first modification made to the linked value;

at least a second computer configured to replicate the object to generate a replica object comprising the plurality of multi-valued attributes that each have the associated values, and comprising a replica of the link table which includes replicas of the individual linked values having to maintain a replica of the value as

1 a link to a plurality of replica linked values associated with the replica object, the
2 replica linked values having associated therewith respective further
3 conflict-resolution data, and wherein where the second computer is adapted to
4 update the further conflict-resolution data associated with a replica linked value in
5 response to at least a further modification made to the replica linked value on the
6 second computer; and

7 at least one of the first computer and the second computer being further
8 configured to resolve a replication conflict between the linked value of the
9 multi-valued attribute in the object and the replica linked value of the multi-valued
10 attribute in the replica object, the replication conflict arising from the first
11 modification modifications made to the linked value on the first computer and
12 from the further modification made to the replica linked value on the second
13 computer, and the replication conflict being resolved, at least in part, based upon
14 the conflict-resolution data and the further conflict-resolution data.
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17 2. **(currently amended)** A network system as recited in claim 1,
18 wherein at least one of the first computer and the second computer is further
19 configured to compare the conflict-resolution data associated with the linked value
20 of the multi-valued attribute in the object and the further conflict-resolution data
21 associated with the replica linked value of the multi-valued attribute in the replica
22 object to resolve the replication conflict.
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1 3. (currently amended) A network system as recited in claim 1,
2 wherein the conflict-resolution data comprises a version indicator that corresponds
3 to a version of ~~an individual~~ the linked value in the object.

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5 4. (currently amended) A network system as recited in claim 1,
6 wherein the conflict-resolution data and the further conflict-resolution data each
7 comprise at least a respective version number that corresponds to a version of ~~an~~
8 individual the linked value and the replica linked value, and wherein at least one
9 of the first computer and the second computer is further configured to:

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11 compare the version number associated with that corresponds to the linked
12 value of the multi-valued attribute in the object and the version number associated
13 with that corresponds to the replica linked value of the multi-valued attribute in
14 the replica object to resolve the replication conflict; and

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16 update the replica linked value of the multi-valued attribute in the replica
17 object if the replica linked value has a lower version number than the linked value
18 of the multi-valued attribute in the object.

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20 5. (currently amended) A network system as recited in claim 1,
21 wherein the conflict-resolution data comprises an update indicator that
22 corresponds to when ~~an individual~~ the linked value in the object is updated.

1 6. (currently amended) A network system as recited in claim 1,
2 wherein the conflict-resolution data and the further conflict-resolution data each
3 comprise ~~at least respective update timestamps that correspond a respective update~~
4 timestamp that corresponds to when an individual the linked valued and the replica
5 linked value ~~is are~~ updated, and wherein at least one of the first computer and the
6 second computer is further configured to:

7 compare the update timestamp ~~associated with that corresponds to~~ the
8 linked value of the multi-valued attribute in the object and the update timestamp
9 associated with that corresponds to the linked value of the multi-valued attribute in
10 the replica object to resolve the replication conflict; and

11 update the replica linked value of the multi-valued attribute in the replica
12 object if the replica linked value has an earlier update timestamp than the linked
13 value of the multi-valued attribute in the object.

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16 7. (currently amended) A network system as recited in claim 1,
17 wherein the conflict-resolution data comprises a creation indicator that
18 corresponds to when ~~an individual the linked value in the object~~ is created.
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1 8. (currently amended) A network system as recited in claim 1,
2 wherein the conflict-resolution data and the further conflict-resolution data each
3 comprise ~~at least respective~~ a creation timestamps that correspond a respective
4 creation timestamp that corresponds to when ~~an individual~~ the linked value and the
5 replica linked value ~~is~~ are created, and wherein at least one of the first computer
6 and the second computer is further configured to:

7 compare the creation timestamp ~~associated with~~ that corresponds to the
8 linked value of the multi-valued attribute in the object and the creation timestamp
9 associated with that corresponds to the replica linked value of the multi-valued
10 attribute in the replica object to resolve the replication conflict; and

11 update the replica linked value of the multi-valued attribute in the replica
12 object if the replica linked value has an earlier creation timestamp than the linked
13 value of the multi-valued attribute in the object.

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15 9. (currently amended) A network system as recited in claim 1,
16 wherein the conflict-resolution data comprises a version indicator that corresponds
17 to a version of ~~an individual~~ the linked value, and comprises an update indicator
18 that corresponds to when the individual linked value is updated.

1 10. (currently amended) A network system as recited in claim 1,
2 wherein the conflict-resolution data and the further conflict-resolution data each
3 comprise ~~at least respective version numbers that correspond a respective version~~
4 number that corresponds to a version of ~~an individual~~ the linked value and the
5 replica linked value, and each comprise ~~at least respective update timestamps that~~
6 correspond a respective update timestamp that corresponds to when the ~~individual~~
7 linked value and the replica linked value is updated, and wherein at least one of
8 the first computer and the second computer is further configured to:

9 compare the conflict-resolution data associated with the linked value of the
10 multi-valued attribute in the object and the further conflict-resolution data
11 associated with the linked value of the multi-valued attribute in the replica object;
12 and

13 resolve the replication conflict in favor of whichever of the linked value or
14 the replica linked value that first has a higher version number, and second has a
15 later update timestamp.

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1 11. (currently amended) A network system as recited in claim 1,
2 wherein the conflict-resolution data and the further conflict-resolution data each
3 comprise at least ~~respective version numbers that correspond a respective version~~
4 number that corresponds to a version of an individual the linked value and the
5 replica linked value, and each comprise at least respective update timestamps that
6 correspond a respective update timestamp that corresponds to when the individual
7 linked value and the replica linked value is updated, and wherein at least one of
8 the first computer and the second computer is further configured to:

9 compare the conflict-resolution data associated with the linked value of the
10 multi-valued attribute in the object and the further conflict-resolution data
11 associated with the replica linked value of the multi-valued attribute in the replica
12 object to resolve the replication conflict;

13 update the replica linked value of the multi-valued attribute in the replica
14 object if the replica linked value has a lower version number than the linked value
15 of the multi-valued attribute in the object; and

16 if the version number associated with that corresponds to the replica linked
17 value of the multi-valued attribute in the replica object is equivalent to the version
18 number associated with that corresponds to the linked value of the multi-valued
19 attribute in the object, update the replica linked value of the multi-valued attribute
20 in the replica object if the replica linked value has an earlier update timestamp
21 than the linked value of the multi-valued attribute in the object.

1 12. (currently amended) A network system as recited in claim 1,
2 wherein the conflict-resolution data comprises a creation indicator that
3 corresponds to when an individual the linked value is created, a version indicator
4 that corresponds to a version of the individual linked value, and an update
5 indicator that corresponds to when the individual linked value is updated.

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7 13. (currently amended) A network system as recited in claim 1,
8 wherein the conflict-resolution data and the further conflict-resolution data each
9 comprise at least respective creation timestamps that correspond a respective
10 creation timestamp that corresponds to when an individual the linked value and the
11 replica linked value is created, each comprise at least respective version numbers
12 that correspond a respective version number that corresponds to a version of the
13 individual linked value and the replica linked value, and each comprise at least
14 respective update timestamps that correspond a respective update timestamp that
15 corresponds to when the individual linked value and the replica linked value is
16 updated, and wherein at least one of the first computer and the second computer is
17 further configured to:

18 compare the conflict-resolution data associated with the linked value of the
19 multi-valued attribute in the object and the further conflict-resolution data
20 associated with the replica linked value of the multi-valued attribute in the replica
21 object; and

22 resolve the replication conflict in favor of whichever of the linked value or
23 the replica linked value that first has a later creation timestamp, second has a
24 higher version number, and third has a later update timestamp.

1 14. (currently amended) A network system as recited in claim 1,
2 wherein the conflict-resolution data and the further conflict-resolution data each
3 comprise at least respective creation timestamps that correspond a respective
4 creation timestamp that corresponds to when an individual the linked value and the
5 replica linked value is created, each comprise at least respective version numbers
6 that correspond a respective version number that corresponds to a version of the
7 individual linked value and the replica linked value, and each comprise at least
8 respective update timestamps that correspond a respective update timestamp that
9 corresponds to when the individual linked value and the replica linked value is
10 updated, and wherein at least one of the first computer and the second computer is
11 further configured to:

12 compare the conflict-resolution data associated with the linked value of the
13 multi-valued attribute in the object and the further conflict-resolution data
14 associated with the replica linked value of the multi-valued attribute in the replica
15 object to resolve the replication conflict;

16 update the replica linked value of the multi-valued attribute in the replica
17 object if the replica linked value has an earlier creation timestamp than the linked
18 value of the multi-valued attribute in the object;

19 if the creation timestamp associated with that corresponds to the replica
20 linked value of the multi-valued attribute in the replica object is equivalent to the
21 creation timestamp associated with that corresponds to the linked value of the
22 multi-valued attribute in the object, update the replica linked value of the
23 multi-valued attribute in the replica object if the replica linked value has a lower

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1 version number than the linked value of the multi-valued attribute in the object;
2 and

3 if the version number associated with that corresponds to the replica linked
4 value of the multi-valued attribute in the replica object is equivalent to the version
5 number associated with that corresponds to the linked value of the multi-valued
6 attribute in the object, update the replica linked value of the multi-valued attribute
7 in the replica object if the replica linked value has an earlier update timestamp
8 than the linked value of the multi-valued attribute in the object.

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10 15. (currently amended) A network system as recited in claim 1,
11 wherein the individual linked values have linked value and the replica linked value
12 each have an associated deletion indicator that is a null identifier to indicate the
13 existence of [[a]] the linked value of the multi-valued attribute in the object and to
14 indicate the existence of the replica linked value of the multi-valued attribute in
15 the replica object.

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17 16. (currently amended) A network system as recited in claim 1,
18 wherein the individual linked values have linked value and the replica linked value
19 each have an associated deletion indicator that corresponds to when an individual
20 the linked value is marked for deletion from the multi-valued attribute in the
21 object, and when the replica linked value is marked for deletion from the
22 multi-valued attribute in the replica object.

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1 17. (currently amended) A network system as recited in claim 1,
2 wherein the individual linked values have linked value and the replica linked value
3 each have an associated deletion timestamp that corresponds to when an individual
4 the linked value is marked for deletion from the multi-valued attribute in the
5 object, and when the replica linked value is marked for deletion from the
6 multi-valued attribute in the replica object, and wherein the second computer is
7 further configured to delete a replica linked value from the multi-valued attribute
8 in the replica object if the replica linked value has a deletion timestamp that
9 indicates the replica linked value is marked for deletion.

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1 18. (previously presented) A static-based replication system,
2 comprising:

3 an object comprising a plurality of multi-valued attributes that each have
4 associated values, at least one having a multi-valued attribute that includes of the
5 object having a link table value which is a reference link to a link table which
6 includes multiple referenced linked values, at least one of the referenced linked
7 values having associated therewith indicators to indicate a change to the
8 referenced linked value of the multi-valued attribute;

9 at least a ~~further~~ an additional object replicating replicated from the object,
10 the ~~further~~ additional object having comprising the plurality of multi-valued
11 attributes that each have the associated values, and comprising a replica of the link
12 table which includes a replica of a referenced linked value a multi-valued attribute
13 that includes a replica value which is a reference link to multiple reference linked
14 values, at least one of the referenced linked values having associated therewith the
15 indicators to indicate a change to the referenced replica linked value of the
16 multi-valued attribute; and

17 a computing device configured to replicate the object and to identify a
18 change to [[a]] the referenced linked value of the multi-valued attribute in the
19 object or a change to the replica linked value of the multi-valued attribute in the
20 additional object by a change to one or more of the indicators corresponding to the
21 referenced linked values of the object or the ~~further~~ additional object.

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23 19. (canceled)

1 **20. (currently amended)** A state-based replication system as
2 recited in claim 18, wherein the indicators comprise a version indicator that
3 corresponds to a version of [[a]] the referenced linked value.

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5 **21. (currently amended)** A state-based replication system as
6 recited in claim 18, wherein the indicators comprise an update indicator that
7 corresponds to when [[a]] the referenced linked value is changed.

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9 **22. (currently amended)** A state-based replication system as
10 recited in claim 18, wherein the indicators comprise a creation indicator that
11 corresponds to when [[a]] the referenced linked value is created.

12
13 **23. (currently amended)** A state-based replication system as
14 recited in claim 18, wherein the indicators comprise a version number that
15 corresponds to a version of [[a]] the referenced linked value and an update
16 timestamp that corresponds to when the referenced linked value is changed.

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18 **24. (currently amended)** A state-based replication system as
19 recited in claim 18, wherein the indicators comprise a creation timestamp that
20 corresponds to when [[a]] the referenced linked value is created, a version number
21 that corresponds to a version of the referenced linked value, and an update
22 timestamp that corresponds to when the referenced linked value is changed.

1 25. (currently amended) A state-based replication system as
2 recited in claim 18, wherein the indicators comprise a deletion indicator that has a
3 null identifier to indicate the existence of [[a]] the referenced linked value of the
4 multi-valued attribute.

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6 26. (currently amended) A state-based replication system as
7 recited in claim 18, wherein the indicators comprise a deletion timestamp that
8 corresponds to when [[a]] the referenced linked value is marked for deletion from
9 the multi-valued attribute.

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11 27. (canceled)

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13 28. (currently amended) A state-based replication system as
14 recited in claim 27, ~~wherein the first and second computers are 18, wherein the~~
15 computing device is further configured to:

16 compare the ~~conflict-resolution information~~ indicators associated with the
17 referenced linked value of the multi-valued attribute in the object first data
18 structure with the ~~conflict-resolution information~~ indicators associated with the
19 replica linked value of the multi-valued attribute in the additional object second
20 data-structure;

21 identify a replication conflict; and

22 resolve the replication conflict with the ~~conflict-resolution information~~
23 indicators associated with the referenced link value and the replica linked value
24 values.

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2 **29-54. (canceled)**
34 **55. (currently amended)** A method, comprising:

5 replicating an object stored in a first directory with a replica object stored in
6 a second directory, the object and the replica object comprising a plurality of
multi-valued attributes that each have associated values, at least one having a
7 multi-valued attribute that includes having a link table value that is a reference to a
8 link table which includes to multiple linked values, the multiple linked values
9 having respective conflict-resolution data associated therewith;

10 comparing an individual linked value of the multi-valued attribute in the
11 object with an individual a replica linked value of the multi-valued attribute in the
12 replica object to identify a replication conflict; and

13 resolving the replication conflict with the conflict-resolution data associated
14 with the individual linked value and the replica linked value values.

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17 **56. (currently amended)** A method as recited in claim 55, wherein
18 the conflict-resolution data comprises a version number that corresponds to a
19 version of an the individual linked value, and wherein said comparing comprises
20 determining if an the individual linked value version number has been changed.

1 **57. (currently amended)** A method as recited in claim 55, wherein
2 the conflict-resolution data comprises a version number that corresponds to
3 respective versions a version of an the individual linked value and the replica
4 linked value, said comparing comprises determining if an the individual linked
5 value version number or the replica linked value version number has been
6 changed, and the method further comprises updating whichever of the individual
7 linked value or the replica linked value of the multi-valued attribute that has a
8 lower version number with the individual linked value or the replica linked value
9 of the multi-valued attribute that has a higher version number.

10 **58. (currently amended)** A method as recited in claim 55, wherein
11 the conflict-resolution data comprises an update timestamp that corresponds to
12 when an the individual linked value is changed, and wherein said comparing
13 comprises determining if an the individual linked value update timestamp has been
14 changed.
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1 59. (currently amended) A method as recited in claim 55, wherein
2 the conflict-resolution data comprises an update timestamp that corresponds to
3 respective versions of when an the individual linked value or the replica linked
4 value is changed, said comparing comprises determining if an the individual
5 linked value update timestamp or the replica linked value update timestamp has
6 been changed, and the method further comprises updating whichever of the
7 individual linked value or the replica linked value of the multi-valued attribute that
8 has an earlier update timestamp with the individual linked value or the replica
9 linked value of the multi-valued attribute that has a later update timestamp.

10 60. (currently amended) A method as recited in claim 55, wherein
11 the conflict-resolution data comprises a creation timestamp that corresponds to
12 when an the individual linked value is created, and wherein said comparing
13 comprises determining if a creation timestamp has been changed.

15 61. (currently amended) A method as recited in claim 55, wherein
16 the conflict-resolution data comprises a creation timestamp that corresponds to
17 respective versions when an the individual linked value or the replica linked value
18 is created, said comparing comprises determining if a creation timestamp has been
19 changed, and the method further comprises updating whichever of the individual
20 linked value or the replica linked value of the multi-valued attribute that has an
21 earlier creation timestamp with the individual linked value or the replica linked
22 value of the multi-valued attribute that has a later creation timestamp.

1 62. (currently amended) A method as recited in claim 55, wherein
2 the conflict-resolution data comprises a version number that corresponds to a
3 version of an the individual linked value and an update timestamp that corresponds
4 to when the individual linked value is changed, and wherein said comparing
5 comprises determining if an the individual linked value version number has been
6 changed and if the individual linked value update timestamp has been changed.

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8 63. (currently amended) A method as recited in claim 55, wherein
9 the conflict-resolution data comprises a version number that corresponds to a
10 version of an the individual linked value and an update timestamp that corresponds
11 to when the individual linked value is changed, and the method further comprises
12 updating the individual linked value of the multi-valued attribute that first has a
13 lower version number, and second has an earlier update timestamp.

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15 64. (canceled)

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1 **65. (currently amended)** A method as recited in claim 55, wherein
2 the conflict-resolution data comprises a creation timestamp that corresponds to
3 when ~~an~~ the individual linked value is created, a version number that corresponds
4 to a version of the individual linked value, and an update timestamp that
5 corresponds to when the individual linked value is changed, and wherein said
6 comparing comprises determining if ~~an~~ the individual linked value creation
7 timestamp has been changed, if the individual linked value version number has
8 been changed, and if the individual linked value update timestamp has been
9 changed.

10 **66. (currently amended)** A method as recited in claim 55, wherein
11 the conflict-resolution data comprises a creation timestamp that corresponds to
12 when ~~an~~ the individual linked value is created, a version number that corresponds
13 to a version of the individual linked value, and an update timestamp that
14 corresponds to when the individual linked value is changed, and the method
15 further comprises updating the individual linked value of the multi-valued attribute
16 that first has an earlier creation timestamp, second has a lower version number,
17 and third has an earlier update timestamp.

19 **67. (canceled)**

1 **68. (currently amended)** A method as recited in claim 55, wherein
2 the individual linked values have a deletion timestamp that is a null identifier to
3 indicate the existence of a linked value of the multi-valued attribute.

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5 **69. (currently amended)** A method as recited in claim 55, wherein
6 the individual linked values have a deletion timestamp that corresponds to when
7 an individual linked value is marked for deletion from the multi-valued attribute.

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9 **70. (currently amended)** A method as recited in claim 55, wherein
10 the individual linked values have a deletion timestamp that corresponds to when
11 an individual linked value is marked for deletion from the multi-valued attribute,
12 and the method further comprises deleting a linked value from the multi-valued
13 attribute if the linked value has a deletion timestamp that indicates the linked value
14 is marked for deletion.

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16 **71-86. (canceled)**